U.S. DEPARTMENT OF THE NAVY

INSTALLATION RESTORATION PROGRAM

NAVAL AIR STATION, BRUNSWICK

BRUNSWICK, MAINE

PROPOSED PLAN

SITE 8
PERIMETER ROAD DISPOSAL SITE

SEPTEMBER 1992

U.S. DEPARTMENT OF THE NAVY
INSTALLATION RESTORATION PROGRAM

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U.S. DEPARTMENT OF THE NAVY
INSTALLATION RESTORATION PROGRAM

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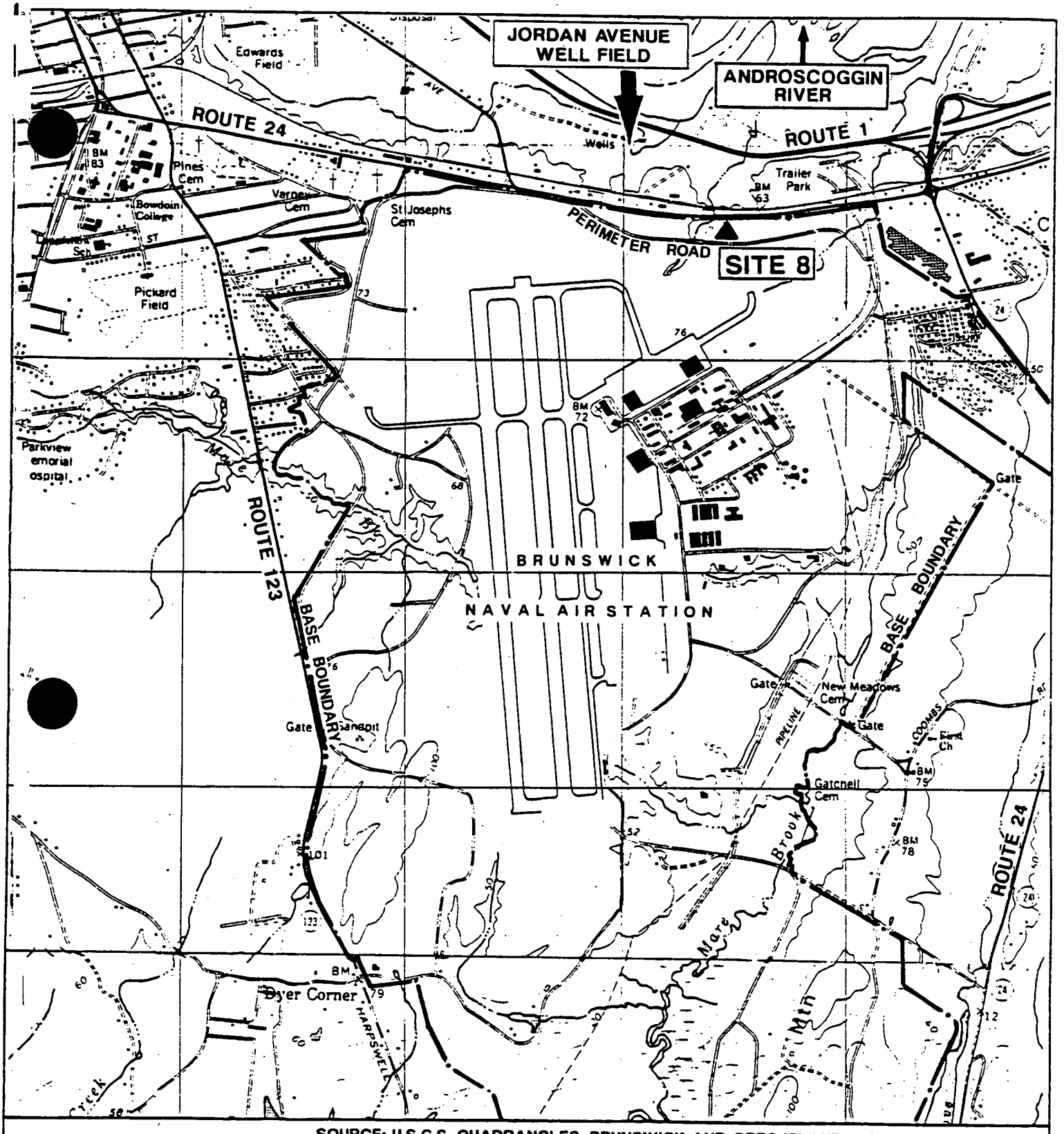
1.0 INTRODUCTION

The U.S. Navy is proposing a cleanup plan, or preferred alternative, to address the Perimeter Road Disposal Site (known as Site 8) at the Naval Air Station (NAS) Brunswick in Brunswick, Maine. This Proposed Plan summarizes **remedial alternatives** developed in the Phase I **Feasibility Study (FS)** completed in August 1990 and evaluated in the Site 8 **Focused Feasibility Study (FFS)** completed in April 1992. The Proposed Plan is a significant milestone in the **Remedial Investigation/** Feasibility Study (RI/FS) process as it represents the transition from studying and evaluating contamination at this site to taking remedial action.

In accordance with Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, the Navy is publishing this Proposed Plan to give the public an opportunity to review and comment on the remedial alternatives under consideration for Site 8 before selecting a final remedy. The Navy, in consultation with the United States Environmental Protection Agency (USEPA) and the Maine Department of Environmental Protection (MEDEP), will select the final remedy for the site after public comments have been reviewed and considered. The Proposed Plan summarizes the results and conclusions of the RI and FFS, so that they are more easily understood. For this reason, technical terms are highlighted in bold print and defined in the glossary at the end of this document.

This Proposed Plan addresses contamination at Site 8. Site 8 was a disposal area reportedly used from 1964 to 1974 to dispose of rubble, debris, and trash generated at NAS Brunswick (R.F. Weston Inc., 1983). Although **solvents** were reportedly disposed of at this site, results of the RI did not show the presence of any solvent-related compounds. The approximate 0.6-acre area is located in the northern portion of the base (Figure 1-1). Perimeter Road, which runs east to west on NAS Brunswick, is south of the site. The location of the disposal area at Site 8 is shown in Figure 1-2.

North of Perimeter Road, the site is a flat, open area with steep, wooded embankments down to two small tributaries bordering the site. Surface runoff from the northern 2,000 feet of NAS Brunswick drains into these tributaries and other drainages, which flow north approximately 1,800 feet from the northern base



SOURCE: U.S.G.S. QUADRANGLES, BRUNSWICK AND ORRS ISLAND, ME. DATED 1984/1978. 7.5 MINUTE SERIES.

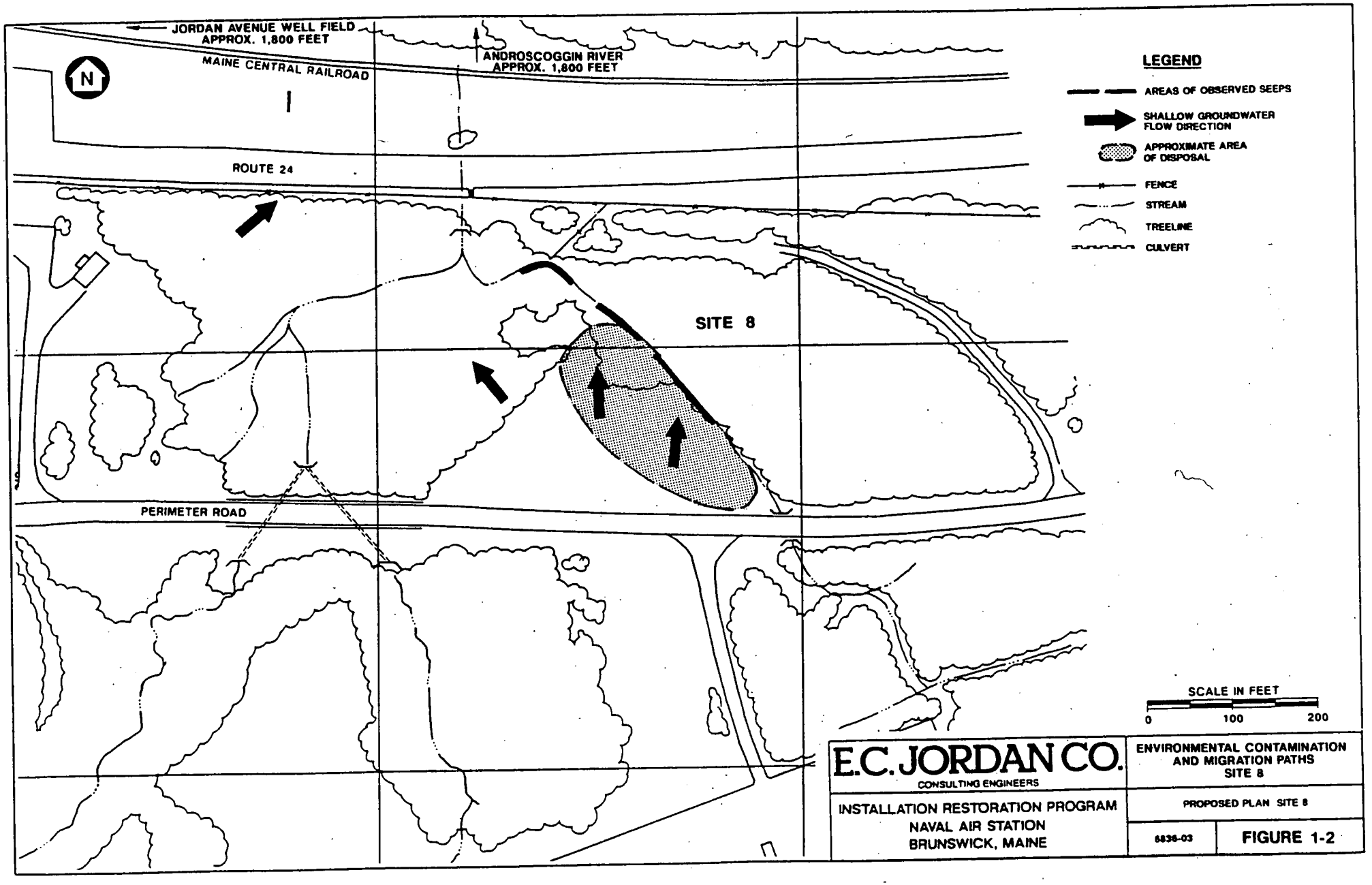
QUADRANGLE LOCATION

N

SCALE IN FEET

0 2000 4000

E.C. JORDAN CO. CONSULTING ENGINEERS	SITE LOCATION MAP SITE 8
INSTALLATION RESTORATION PROGRAM NAVAL AIR STATION BRUNSWICK, MAINE	PROPOSED PLAN SITE 8
	6836-03 FIGURE 1-1


JORDAN AVENUE WELL FIELD
APPROX. 1,800 FEET
MAINE CENTRAL RAILROAD
ANDROSCOGGIN RIVER
APPROX. 1,800 FEET
N
ROUTE 24
SITE 8
PERIMETER ROAD
LEGEND
AREAS OF OBSERVED SEEPS
SHALLOW GROUNDWATER FLOW DIRECTION
APPROXIMATE AREA OF DISPOSAL
FENCE
STREAM
TREELINE
CULVERT
SCALE IN FEET
0
100
200
E.C. JORDAN CO.
CONSULTING ENGINEERS
ENVIRONMENTAL CONTAMINATION AND MIGRATION PATHS SITE 8
INSTALLATION RESTORATION PROGRAM
NAVAL AIR STATION
BRUNSWICK, MAINE
PROPOSED PLAN SITE 8
6836-03
FIGURE 1-2

boundary and discharge to the Androscoggin River. The Jordan Avenue Wellfield, a municipal drinking water supply for the town of Brunswick, is located approximately 1,800 feet northwest of Site 8. Contaminants detected at Site 8.include **polynuclear aromatic hydrocarbons (PAHs)** in surface and shallow soil and **dichlorodiphenyltrichloroethane (DDT)** in **leachate sediment** (Figure 1-3) (E.C. Jordan Co., 1990). PAHs were detected in **test pit** soil samples collected in the eastern portion of the site at concentrations ranging from 2.7 to 53 **milligrams per kilogram (mg/kg)** of total PAHs. **Carcinogenic** PAH concentrations ranged from less than 2.5 to 30 mg/kg. DDT was detected at one leachate location in sediment at concentrations ranging from 0.034 to 0.058 mg/kg. The presence of DDT at Site 8 was an initial concern because this compound is known to bioaccumulate and bioconcentrate in aquatic and terrestrial food chains. However, because of the small area of contamination and relatively low levels (i.e., less than 0.06 mg/kg) detected at Site 8, DDT is not expected to cause adverse impacts to the ecological receptors in this area. (This is discussed in more detail in Section 4.0.) Other contaminants were detected at Site 8, but at concentrations that do not pose a risk to human health or the environment (E.C. Jordan Co., 1990). No trash or **source** areas of gross contamination were identified during field investigations at this site.

The Navy's preferred alternative for Site 8 includes constructing a cover over the disposal area that is consistent with State of Maine performance requirements for an **attenuation landfill**. The preferred alternative is described in greater detail in Section 6.0 of this document.

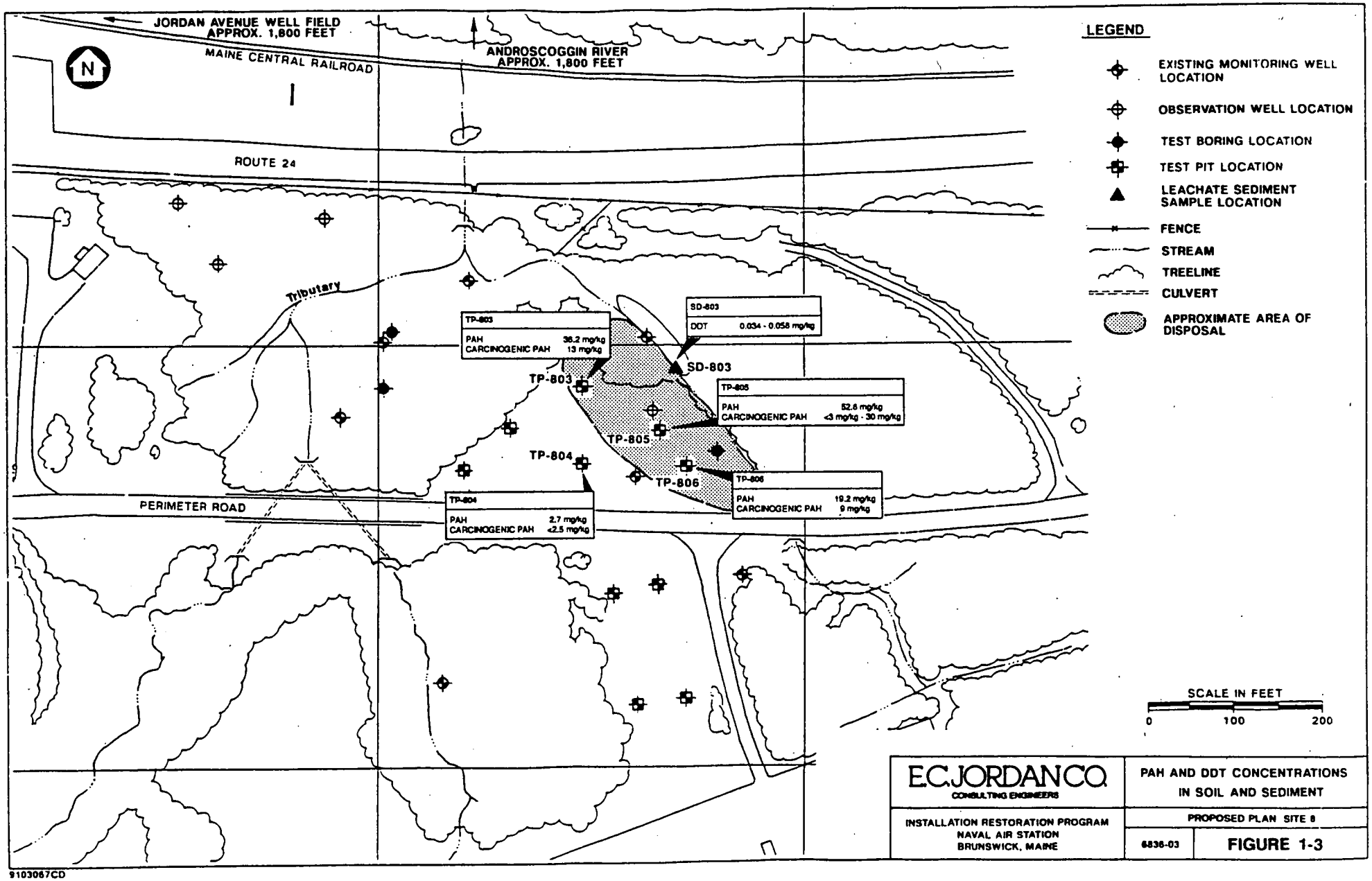
This Proposed Plan:

1. explains the opportunities for the public to comment on the remedial alternatives (see Section 2.0);

2. includes a brief history of the site and the principal findings of the RI (see Section 3.0);

3. provides a brief description of the preferred alternative and other alternatives evaluated in the FFS (see Sections 6.0 and 7.0);

4. outlines the criteria used by the Navy to propose an alternative for use at the site, and briefly analyzes whether the alternatives would meet each criterion (see Section 8.0); and


JORDAN AVENUE WELL FIELD
APPROX. 1,800 FEET
MAINE CENTRAL RAILROAD
ANDROSCOGGIN RIVER
APPROX. 1,800 FEET
N
ROUTE 24
Tributary
PERIMETER ROAD
TP-803
PAH 36.2 mg/kg
CARCINOGENIC PAH 13 mg/kg
SD-803
DDT 0.034 - 0.058 mg/kg
SD-803
TP-803
TP-805
PAH 52.6 mg/kg
CARCINOGENIC PAH <3 mg/kg - 30 mg/kg
TP-804
TP-806
TP-804
PAH 2.7 mg/kg
CARCINOGENIC PAH <2.5 mg/kg
TP-806
PAH 19.2 mg/kg
CARCINOGENIC PAH 9 mg/kg
LEGEND
EXISTING MONITORING WELL LOCATION
OBSERVATION WELL LOCATION
TEST BORING LOCATION
TEST PIT LOCATION
LEACHATE SEDIMENT SAMPLE LOCATION
FENCE
STREAM
TREELINE
CULVERT
APPROXIMATE AREA OF DISPOSAL
SCALE IN FEET
0
100
200
E.C. JORDAN CO.
CONSULTING ENGINEERS
PAH AND DDT CONCENTRATIONS IN SOIL AND SEDIMENT
INSTALLATION RESTORATION PROGRAM
NAVAL AIR STATION
BRUNSWICK, MAINE
PROPOSED PLAN SITE 8
6836-03
FIGURE 1-3

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5. presents the Navy's rationale for its preliminary selection of the preferred alternative for Site 8 (see Section 9.0).

To help the public review the cleanup options for the site, this document also includes information about where interested citizens can find more detailed descriptions of the remedy selection process and the alternatives under consideration for Site 8 at NAS Brunswick.

2.0 THE PUBLIC'S ROLE IN EVALUATING REMEDIAL ALTERNATIVES

The Navy is offering the public the opportunity to review this Proposed Plan and comment on the remedial alternatives described herein. The following paragraphs provide information on how the public can get involved in the review process.

2.1 PUBLIC INFORMATIONAL MEETING AND PUBLIC HEARING

The Navy will hold a public informational meeting at 7 p.m. on Thursday, October 15, 1992, at the Jordan Acres School on Merrymeeting Road in Brunswick, Maine, to describe the preferred alternative and other alternatives evaluated in the FFS. The public is encouraged to attend the meeting to hear the presentations and to ask questions. The Navy also will hold a formal public hearing immediately following the informational meeting to accept verbal comments on the cleanup alternatives under consideration for Site 8. This hearing will provide the opportunity for people to formally comment on the Proposed Plan after they have heard the presentations made at the informational meeting. Comments made at the meeting will be recorded and transcribed, and a copy of the transcript will be added to the **Administrative Record** at the Public Works Office at NAS Brunswick and will also be made available at the following location:

Curtis Memorial Library
23 Pleasant Street
Brunswick, Maine 04011
(207) 725-5242
Hours:
Monday-Wednesday: 9:30 a.m. - 8:00 p.m.
Thursday-Friday: 9:30 a.m. - 6:00 p.m.
Saturday: 9:30 a.m. - 5:00 p.m.

2.2 PUBLIC COMMENT PERIOD

The Navy is conducting a 30-day public comment period from October 1 to October 30, 1992, to provide an opportunity for public involvement in the cleanup decision. During the comment period, the public is invited to review this Proposed

Plan and the RI, Supplemental RI, Phase I FS, and FFS reports and to offer comments to the Navy.

2.3 WRITTEN COMMENTS

If, after reviewing the information on the site, you would like to comment in writing on the Navy's preferred alternative, any of the other cleanup alternatives under consideration for Site 8, or other issues relevant to the cleanup of Site 8, please deliver your comments to the Navy at the Public Hearing or mail your written comments (postmarked no later than October 30, 1992) to:

Department of the Navy
Northern Division
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop 82
Town of Lester, Pennsylvania 19113-2090
Attn: James Shafer, Code 1821

2.4 THE NAVY'S REVIEW OF PUBLIC COMMENT

The Navy will consider comments received from the public as part of the process of reaching a final decision on the most appropriate remedial alternative for cleanup of Site 8. The Navy's final choice of a remedy will be documented in a **Record of Decision (ROD)** for the site and submitted to the MEDEP and the USEPA for review, approval, and signature. Public comment is an important part of the ROD process and will be considered in the final remedy selection. A document, called a Responsiveness Summary, that summarizes the Navy's responses to comments received during the public comment period, will be issued with the ROD. Public comment is being solicited on all the remedial alternatives described in this Proposed Plan. Once the ROD is signed by the USEPA Regional Administrator, it will become part of the Administrative Record.

2.5 ADDITIONAL PUBLIC INFORMATION

Because this Proposed Plan provides only a summary description of the field investigations and the cleanup alternatives considered for Site 8, the public is encouraged to consult the Curtis Memorial Library, which contains the RI, Supplemental RI, Phase I FS, and FFS reports, for more detailed information on the site and all the remedial alternatives under consideration. These documents are part of the Administrative Record and are available for review at the Curtis Memorial Library, at the address listed in Subsection 2.1.

If you have any questions about the site or would like more information, you may call or write:

Public Affairs Office
Attn: Mike L'Abbé
Naval Air Station Brunswick
Brunswick, Maine 04011
(207) 921-2340

or

Meghan Cassidy, Remedial Project Manager
U.S. Environmental Protection Agency
HAN-CAN1
JFK Federal Building
Boston, Massachusetts 02203
(617) 573-5785

or

Mark Hyland, Director
Federal Facilities Remediation
Office of the Commissioner
State House Station 17
Augusta, Maine 04333
(207) 289-2651

3.0 BASE HISTORY

NAS Brunswick is located south of the Androscoggin River between Brunswick and Bath, Maine. NAS Brunswick is an active facility supporting the U.S. Department of the Navy's antisubmarine warfare operations in the Atlantic Ocean and Mediterranean Sea. The primary mission of the base is to operate and maintain P-3 Orion aircraft. NAS Brunswick first became active in the 1940s during World War II, and underwent major expansion in the 1950s.

With growing awareness of the long-term effects of hazardous materials on the environment, the Department of Defense, in 1975, developed a program to address the conditions created by past events and practices. The Installation Restoration Program (IRP) was designed to identify, evaluate, and remediate (clean up) former disposal and spill sites at defense facilities. Originally, the Navy's part of this program was called the Navy Assessment and Control of Installation Pollutants (NACIP) Program. Early reports produced for NAS Brunswick reflect the NACIP process and terminology. The Navy eventually adopted the program structure and terminology of the standard IRP to be consistent with the regulatory programs established by new legislation.

The IRP meets the requirements of CERCLA and the Superfund Amendments and Reauthorization Act (SARA) and is conducted in several stages:

- Research is conducted in the Preliminary Assessment stage to identify potential hazardous waste sites. [This was called the **Initial Assessment Study (IAS)** under the old NACIP program.]

- Site Inspections then confirm which areas contain contamination, constituting actual "sites." [This was called the **Pollution Abatement Confirmation (PAC)** Study or Step 1A Verification under the old NACIP program.]

- Next, the RI and FS together characterize the type and distribution of contamination, establish criteria for cleanup, and identify and evaluate any necessary remedial action alternatives and their costs. As part of the RI/FS, a **Risk Assessment** identifies potential effects on human

health and/or the environment to help evaluate the need for and effectiveness of remedial alternatives.

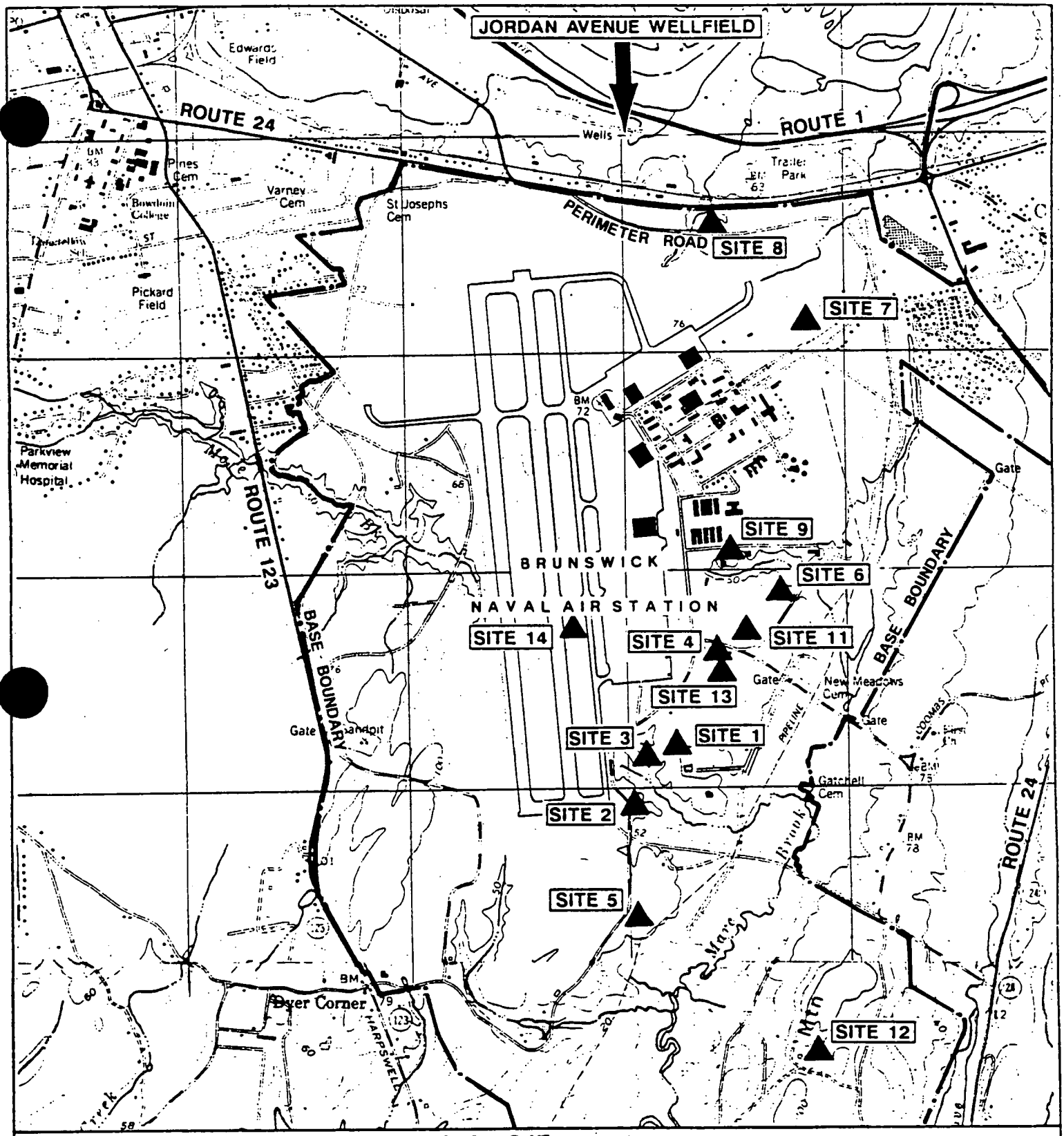
- A cleanup remedy is proposed and described in the Proposed Plan.
- A remedy is selected and documented in the ROD.
- The selected alternative is designed and implemented in the Remedial Design and Remedial Action stages. The Remedial Action is implemented subsequent to a signed ROD.

In 1983, an IAS was completed detailing historical hazardous material usage and waste disposal practices, and in 1984, a PAC Study was conducted at NAS Brunswick (R.F. Weston, Inc., 1983 and E.C. Jordan Co., 1985). These studies recommended further investigation of seven of the 10 hazardous waste sites originally identified, and the RI/FS process for those seven sites began in 1987. Based on further information, two more sites were added to the RI/FS program in 1989, as were two sites originally identified in the IAS. Two additional sites were included in the program in 1990 for a total of 13 sites that the Navy is currently studying under the IRP (Figure 3-1). One site identified in the IAS, Site 10, is no longer under the jurisdiction of NAS Brunswick and is not included under the IRP.

In 1987, NAS Brunswick was placed on the USEPA's **National Priorities List (NPL)**. Private-sector NPL sites are eligible for funding from the national environmental trust fund called **Superfund** and are often called Superfund sites. However, Department of Defense sites such as NAS Brunswick are funded through the Defense Environmental Restoration Account.

In 1990, the Navy entered into a Federal Facility Agreement (FFA) with the USEPA and the MEDEP regarding the cleanup of environmental contamination at NAS Brunswick. The FFA sets forth the roles and responsibilities of each agency, sets deadlines for the investigation and cleanup of hazardous waste sites, and establishes a mechanism to resolve disputes among the agencies.

In August 1990, the Navy completed Draft Final RI and Phase I FS reports. The RI report described field sampling investigations, geology, and hydrogeology, and presented contamination and risk assessments. The Draft Final Phase I FS identified remedial action objectives, and developed and screened remedial alternatives for the



SOURCE: U.S.G.S. QUADRANGLES, BRUNSWICK, AND ORRS ISLAND, ME., 1984, 1978, 7.5 MINUTE SERIES.

QUADRANGLE LOCATION

SCALE IN FEET

0 2000 4000

E.C. JORDAN CO. CONSULTING ENGINEERS	SITE LOCATION MAP
INSTALLATION RESTORATION PROGRAM NAVAL AIR STATION BRUNSWICK, MAINE	PROPOSED PLAN SITE 8
	6836-03 FIGURE 3-1

nine original sites studied in the Draft Final RI. In April 1991, the Navy submitted for regulatory review the Draft Final Supplemental RI and FS reports for the additional four sites. The Supplemental RI also included results of additional investigations of Site 8.

Because the Navy is committed to providing a timely response to environmental contamination at NAS Brunswick, a strategy was developed to expedite the RI/FS process. This strategy involves identifying the sites for which enough information now exists to proceed to the Proposed Plan phase of the process. Separate timetables have been established for completing the Final FS reports and RODs for these sites. The Navy identified Sites 1 and 3, Site 8, and the **groundwater** associated with Sites 4, 11, and 13 (referred to as the Eastern Plume) as three distinct areas of contamination and believed the remedial process could be initiated for these areas. FFSs for Sites 1 and 3 and Site 8, and an FS for 10 other sites (i.e., Sites 2, 4, 5, 6, 7, 9, 11, 12, 13, and 14; see Figure 3-1) have been submitted to the regulatory agencies for review. Proposed Plans for remediating Sites 1 and 3 and the Eastern Plume have also been submitted. RODs for these areas have been signed and remedial design of the selected alternatives is currently underway.

This Proposed Plan is a significant milestone in the remedial process for Site 8. It marks the transition from the investigation phase to the remedial action phase of the IRP. A summary of the RI (including the risk assessment) and FS Reports for Site 8 are presented in the following subsections.

3.1 RESULTS OF THE REMEDIAL INVESTIGATION

An RI is conducted to define the nature and distribution of contamination at a site. As part of the RI for Site 8, the Navy conducted field activities and environmental sampling to determine the geologic and hydrologic conditions and the distribution of contamination at this site. The results of the RI are presented in Section 10.0 of the Draft Final RI Report (E.C. Jordan Co., 1990) and Section 6.0 of the Draft Final Supplemental RI Report (E.C. Jordan Co., 1991). These documents are part of the Administrative Record and are also available for review at the Curtis Memorial Library in Brunswick, Maine.

The RI fieldwork was designed to assess the areal distribution of wastes deposited at the site, monitor groundwater downgradient of Site 8, assess the significance of

chemicals detected in the groundwater, and determine the impact of this site on surface water and sediment quality.

RI field activities included a **geophysical survey**; soil borings; installation of **monitoring wells** and **observation wells**; a **soil gas survey**; test pits; sampling of soils, groundwater, surface water, sediment, and leachate seeps; and in situ aquifer permeability tests. Results of these investigations are summarized below, and an interpretation of the possible health and environmental effects resulting from the contamination identified during the RI is presented in Section 4.0.

3.1.1 Groundwater Flow and Subsurface Geology

Groundwater movement directly beneath the disposal area is locally northward and northeastward, discharging quickly to the adjacent ravine. The calculated seepage velocity for the immediate vicinity of the refuse is 19 feet per day; consequently, infiltration through the disposal area discharges to the adjacent ravine in a matter of days (E.C. Jordan Co., 1990).

Groundwater at Site 8 occurs in the **overburden soil**. The overburden soil at Site 8 is a **stratified** formation consisting of a sand layer, a **transition** layer, and a clay layer overlying **bedrock**. The elevation of ground surface at the site is approximately 65 feet mean sea level (MSL). The top of bedrock has been interpreted by seismic data to occur at a depth of 30 feet MSL on the eastern side of the site to a depth of -50 feet MSL to the west, or approximately 35 to 110 feet below ground surface (bgs) across the site. In the disposal area, the fill extends to a depth of 28.5 feet bgs.

Site 8 has been of special interest because of the location of the Jordan Avenue Wellfield approximately 1,800 feet to the northwest. A primary goal of subsurface investigations was to assess the possibility of a hydraulic connection between Site 8 and this municipal wellfield. Based on geologic, hydrogeologic, and chemical data gathered for the RI as well as additional data gathered for the Supplemental RI, Site 8 and the Jordan Avenue Wellfield are known not to be hydraulically connected.

3.1.2 Geophysical Surveys

The magnetometer survey identified the presence of buried ferrous material along the northeastern area of the site. In contrast, natural soils were observed on the southern side of Perimeter Road, and in the western portion of Site 8 north of

Perimeter Road. The disposal area is restricted to the northeastern corner of the site, north of Perimeter Road, where debris was pushed into a natural ravine (see Figure 1-2).

3.1.3 Surface and Subsurface Soils

A soil gas survey was conducted during the RI to help identify potential areas of volatile organic compound (VOC) contamination. VOCs were not detected. Analytical soil data were consistent with the disposal area as identified by the geophysical survey. PAHs and DDT were found in subsurface soil samples from test pits in the disposal area. Environmental contamination was present in only four test pits located in the northeastern area of Site 8 (see Figure 1-3). Analytical soil samples from Site 8 soil borings did not detect environmental contamination.

3.1.4 Leachate Seeps and Sediments

Pesticides and polychlorinated biphenyls (PCBs) were not reported in Site 8 leachate samples, but the PCB Aroclor-1248 was detected at 440 **micrograms per kilogram (μg/kg)** in one leachate sediment sample, and DDT was reported in three of four sampling rounds at one sampling location (i.e., SD-803) at 30 to 58 μg/kg. PAHs were also found in sediments associated with leachate just below the disposal area and further downgradient from the source. Some PAHs north and west of the disposal area may be related to surface water runoff from Route 24. PAHs can result from combustion of hydrocarbon fuels, and can be found in automobile exhaust (Edwards, 1983). Several catch basins collect highway runoff and direct it into the tributary bordering Site 8.

3.1.5 Surface Water and Sediments

Environmental contamination in Site 8 **surface water** includes a number of inorganic contaminants, such as aluminum, calcium, chromium, cyanide, iron, lead, manganese, sodium, and zinc; however, only aluminum, cyanide, iron, lead, and zinc were considered ecological contaminants of concern. High concentrations of sodium, chloride, and cyanide have been attributed to the presence of a salt pile upgradient of the site. A study conducted by the Maine Department of Transportation documented the use of sodium ferrocyanide as a de-caking agent in road salt, linking it to cyanide contamination near salt storage piles (Olson and Ohno, 1989). More information on salt storage near Site 8 can be found on page 10-32 of the Draft Final

RI report (E.C. Jordan Co., 1990). The salt pile has since been covered to reduce runoff. Concentrations of zinc above Ambient Water Quality Criteria (AWQC) are believed to be the result of the streams scouring down to silt-rich soils, where background concentrations of zinc in these sediments are relatively high.

Organic contaminants were not detected in surface water; however, PAHs were detected in associated sediment samples.

3.1.6 Groundwater

Groundwater at Site 8 has elevated concentrations of several inorganic contaminants relative to concentrations of inorganics in uncontaminated wells at NAS Brunswick. The association of sodium, chloride, and cyanide with road salt was also observed in one monitoring well. Cadmium was detected at concentrations that exceeded its **Maximum Contaminant Level (MCL)** in wells MW-807 and MW-808 in Round II and MW-803 in Round IV. Lead exceeded its MCL in MW-801, upgradient of the site.

Most inorganic contaminants were detected sporadically (i.e., inconsistently between five sampling rounds) or at low concentrations. Most of the Site 8 wells are screened in silt or clay (i.e., MW-801, MW-803, MW-804, MW-807, and MW-808). High concentrations of inorganics occurred in unfiltered samples from these wells, and may be related to the geologic media at the site.

Organic compounds were not detected in groundwater at Site 8.

4.0 SUMMARY OF SITE RISKS

A human health and ecological risk assessment was conducted to identify current and future potential risks to human health and the environment from contamination at Site 8. Both cancer and noncancer risks were evaluated. These risk assessments can be found in Appendix Q and are summarized in Section 15.0 of the Draft Final RI Report (E.C. Jordan Co., 1990). Since submittal of the RI, additional risk estimates for Site 8 were developed at the request of USEPA Region I based on more recent guidance (USEPA, 1991). The revised risk estimates can be found in Appendix E of the FFS and risks are summarized in Subsections 2.2.1 and 2.2.2 of the FFS (E.C. Jordan Co., 1992). These documents are part of the Administrative Record and are also available for review at the Curtis Memorial Library in Brunswick, Maine.

The risk assessments estimate the current and future potential risks to human health and the environment posed by contaminants detected in the soils, sediment, surface water, and groundwater. These risks are based on contaminant levels detected at the site during the sampling events and described in the RI Report (E.C. Jordan Co., 1990). For the future risk estimates, a residential exposure scenario, assuming long-term repetitive exposure through direct contact and incidental ingestion of soil occurring 350 days per year for 30 years, was also considered. This scenario would simulate the potential risks associated with future residential land use should the base close (E.C. Jordan Co., 1992).

Carcinogenic (i.e., cancer) risk estimates are compared to a target risk range established by USEPA of 10^{-4} to 10^{-6}. Risks exceeding 10^{-4} (i.e., one in 10,000) are considered unacceptable. For noncarcinogenic risks, a Hazard Index above 1.0 is unacceptable according to USEPA. The current human health risks associated with direct contact with PAH-contaminated surface soils using the predicted exposure scenarios range from 6.8×10^{-6} (for exposure to average contaminant concentrations) to 1.5×10^{-5} for the worst case scenario (for exposure to the maximum concentrations). Risks associated with exposure to lead and DDT in soil were below levels considered to pose a health risk (i.e., a Hazard Index less than 1.0). Risks associated with exposure to sediment (both leachate and drainage sediment) and surface water under current and reasonable future land use were also below levels considered to present a risk to human health (E.C. Jordan Co., 1990).

Additional risk estimates presented in the FFS for the future residential scenario resulted in total incremental carcinogenic risks of 1×10^{-4}, 6×10^{-5}, and 3×10^{-4}, based on exposure to the average, mean, and maximum detected concentrations. The risk estimates based on exposure to the average and mean concentrations fall within the USEPA target risk range of 10^{-4} to 10^{-6}. The risk estimate based on exposure to the maximum concentration slightly exceeds the 10^{-4} risk level. This upper bound estimate of 3×10^{-4} is based on conservative exposure assumptions (i.e., long-term repetitive exposure to the maximum detected concentration), and the limited number of contaminants of concern (i.e., only PAHs). While this estimate is not considered to represent a significant health risk at Site 8, it does warrant action based on USEPA guidance.

Potential risks associated with exposure to groundwater were evaluated based on a comparison of contaminant concentrations to MCLs, **Maximum Contaminant Level Goals (MCLGs)**, **Maximum Exposure Guidelines (MEGs)**, or health-based criteria. Cadmium was the only contaminant detected in the groundwater, downgradient from the site, above its respective drinking water standard or health-based criteria. The concentration of cadmium detected downgradient of Site 8 ranged from non-detect to 0.012 **milligrams per liter (mg/L)**. Each well was sampled five times, and cadmium was detected once above its MCL in three different wells. The MCL for cadmium is 0.005 mg/L. The MCL is the maximum permissible concentration allowed in water that is consumed as drinking water. Groundwater at Site 8 is not used for drinking water.

A mixture of soil and sediment from Site 8 was analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) to determine the leachability of contaminants (especially PAHs) from the soil. This sample contained measurable amounts of PAHs; however, PAHs were not detected in the TCLP extract. This suggests that leaching of PAHs from soils at Site 8 is not occurring. Analysis of groundwater at the site did not detect PAHs.

Potential environmental risks at Site 8 are associated with exposure to contaminants in leachate, sediment, and surface water. Exposure to contaminants by wildlife drinking from leachate seeps and from uptake of soil contaminants into the terrestrial food chain appear minimal (E.C. Jordan Co., 1990). Exposure to DDT in leachate sediment was an initial concern because of the propensity of this compound to bioaccumulate and bioconcentrate in food chains. However, the ecological risk assessment estimated an **ecological Hazard Index** associated with exposure to DDT

at Site 8 to be less than 1.0. At a Hazard Index of less than 1.0, population-level effects are not expected to occur.

Aquatic and terrestrial receptors could be exposed to iron, aluminum, lead, cyanide, and zinc in surface water. Surface drainage from the runway and Route 24 appears to be impacting surface water downgradient of Site 8. Aquatic organisms that occur in the stream habitat associated with Site 8 may be exposed to contaminant concentrations that exceed AWQC, indicating that these receptors may be adversely affected. Potential risk to these receptors is due almost entirely to the elevated concentrations of lead detected in these tributaries which exceed both acute and chronic AWQC for this contaminant.

For a complete explanation of the risks posed by contamination at Site 8, please refer to Subsections 2.2.1 and 2.2.2 and Appendix E of the FFS, which is available at the Curtis Memorial Library in Brunswick, Maine.

5.0 PROPOSED CLEANUP OBJECTIVES AND LEVELS

The estimated incremental cumulative carcinogenic risks to an individual under the current exposure scenarios were within or below the USEPA's 10^{-4} to 10^{-6} target risk range and the noncarcinogenic Hazard Index was below 1.0. The assumed worst-case future residential exposure scenario resulted in a risk slightly higher than 10^{-4}. While this scenario is unlikely, limited remedial actions such as institutional controls to prevent development at Site 8 or a soil cover to limit exposure to site soil contaminants would address this potential risk. Action taken to meet the State of Maine's requirements for site closure would minimize potential future risks.

Remedial action objectives for Site 8 include media-specific goals established to provide an adequate level of protection to human and ecological receptors based on the results of the baseline risk assessment. Remedial action objectives were not developed to reduce contaminant concentrations in surface water. Iron, lead, cyanide, and aluminum were detected at elevated concentrations (compared to background) in both upstream and downstream sampling locations, suggesting that other nonpoint source areas (i.e., salt pile, site soils, surface runoff, and off-base salting activities) are contributing to the current level of contamination detected around Site 8 (E.C. Jordan Co., 1990). Because these contaminants are not related to Site 8, specific remedial actions taken to reduce contaminant concentrations emanating from Site 8 are not warranted and would not be effective in reducing potential exposure concentrations.

One contaminant, cadmium, was detected three times in the groundwater at concentrations (i.e., 7.2, 9.4, and 12.6 **micrograms per liter [μg/L]**) in excess of its federal MCL (i.e., 5 μg/L). However, there is no current exposure to groundwater and no downgradient receptors, and it is unlikely that the aquifer would be used for future domestic or potable purposes because it is shallow and discharges directly to the tributaries. Cadmium and other inorganic contaminants were detected sporadically or at low concentrations in site groundwater, and are believed to be related to the geologic media in which the wells are screened. No other soil contaminants (i.e., PAHs and pesticides) were detected in the groundwater.

6.0 THE NAVY'S PREFERRED ALTERNATIVE

The Navy's selection of the preferred alternative for Site 8, as described in this Proposed Plan, is the result of a comprehensive evaluation, screening, and regulatory agency review process. The Draft Final Phase I FS for the site was conducted to identify remedial technologies and develop alternatives that could address contamination at the site (E.C. Jordan Co., 1990). The FFS report for Site 8 describes all the alternatives developed, and the process and criteria the Navy used to evaluate each alternative.

Based on comments received from the USEPA, the Draft Final FFS was revised and reissued to reflect the results of additional risk estimates developed using new guidance from the USEPA (USEPA, 1991). The results of the risk assessment showed that the only unacceptable risk to human health would be through long-term repetitive exposure (i.e., 350 days per year for 30 years) to maximum concentrations of carcinogenic PAHs in soil. As a result of the revised risk assessment, the April 1992 FFS report contained modified cleanup objectives and described and evaluated three alternatives that were slightly different from those presented in the Draft Final FFS. These alternatives represented a range of actions. The No Action alternative was included to comply with the **National Oil and Hazardous Substances Contingency Plan (NCP)** and to use as a **baseline** to measure the effectiveness of the other alternatives. The No Action Alternative described in the Draft Final FFS report was renamed Minimal Action because it included institutional controls and environmental monitoring. The Soil Cover Alternative was revised to meet the MEDEP requirements for closure of a construction/demolition debris landfill. The Excavation/Solidification Alternative was eliminated because treatment of Site 8 soils is not necessary based on the revised risk estimates and cleanup objectives (E.C. Jordan Co., 1992).

Of the three alternatives presented in the Site 8 FFS report, the Soil Cover Alternative consisting of 6 inches of topsoil over a geotextile fabric filter was initially proposed by the Navy as the preferred alternative for Site 8. This alternative was designed to meet the performance requirements of the Maine Landfill Disposal Regulations for Construction/Demolition Debris, Inert Fill, Land Clearing Debris, and Woodwaste (38 MRSA Section 1304, Chapter 404). However, based on comments received from the State's review of the Draft Proposed Plan, the Navy has modified the preferred alternative to include a low-permeability cover over the site

that would meet the performance requirements for closure of an attenuation landfill (38 MRSA Section 1304, Chapter 401.7). Although Site 8 was designed and operated as an open dump, not an attenuation landfill, Chapter 401.7 requirements are relevant and appropriate because of the low level of risk this site poses. These requirements are more stringent than the requirements for construction/demolition debris landfills. Other modifications to the preferred alternative, such as environmental monitoring and institutional controls, were also included in response to requests by USEPA and the Brunswick Area Citizens for a Safe Environment. For these reasons, the preferred alternative presented in this Proposed Plan is different from the alternatives presented in the FFS.

The following paragraphs describe the preferred alternative and Section 7.0 presents the other alternatives developed by the Navy for Site 8.

Preferred Alternative: Soil Cover

This alternative includes a low-permeability soil cover that would be designed and constructed to minimize infiltration of rainwater into the disposal area. The design of the cover system would meet the minimum performance requirements of the MEDEP regulations for the closure of attenuation landfills (i.e., maximum permeability of 5×10^{-7} centimeters per second and 5 to 33 percent slopes). Although human health risks were not identified as a significant concern, this alternative would prevent contact with soil contaminants and mitigate the potential risk associated with exposure to the maximum concentration of carcinogenic PAHs under a future residential exposure scenario. This alternative differs from the Soil Cover Alternative presented in the FFS report based on comments received from MEDEP.

This alternative includes the following components:

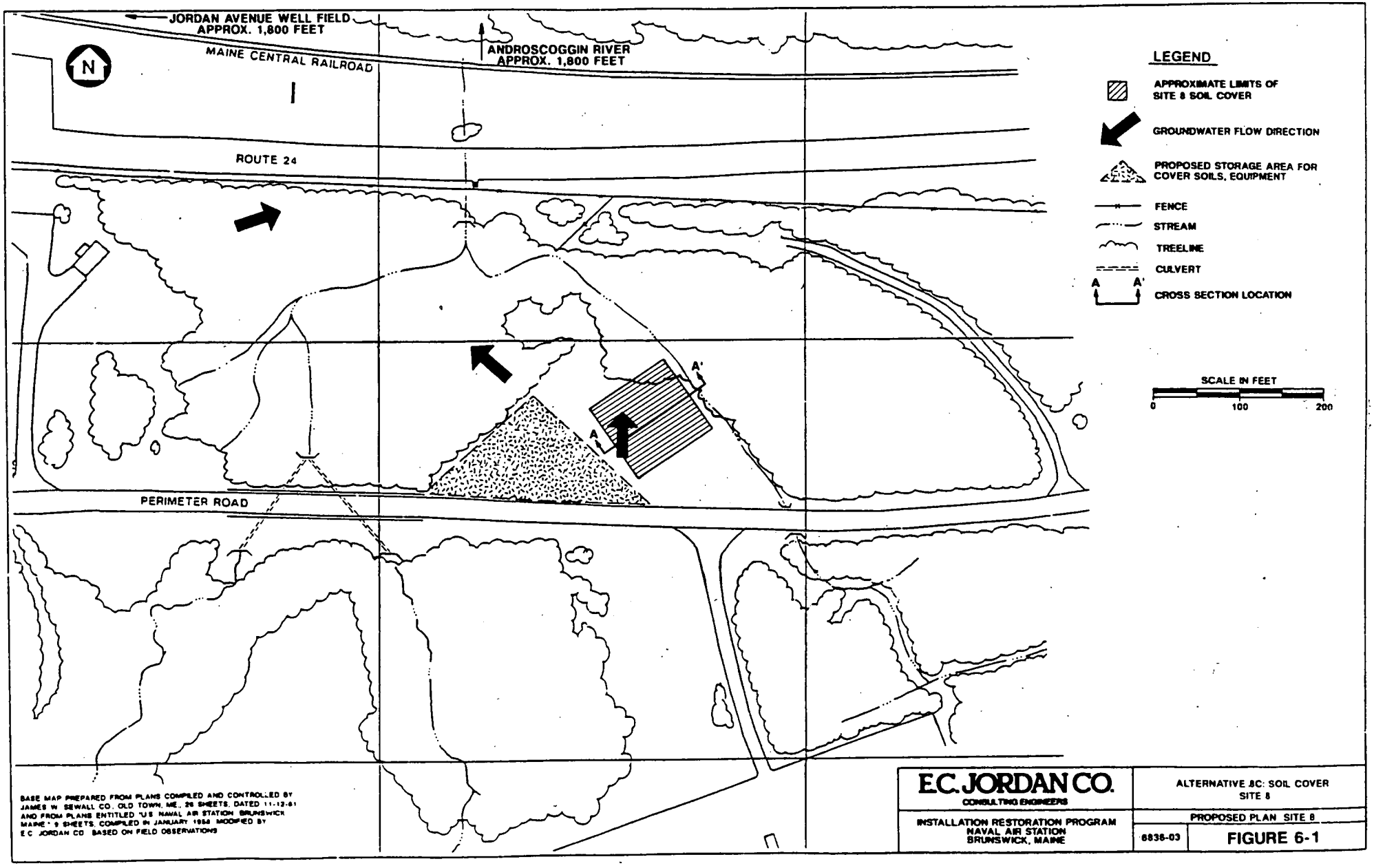
- site preparation
- cover construction
- site inspections/maintenance
- institutional controls
- environmental monitoring
- five-year reviews

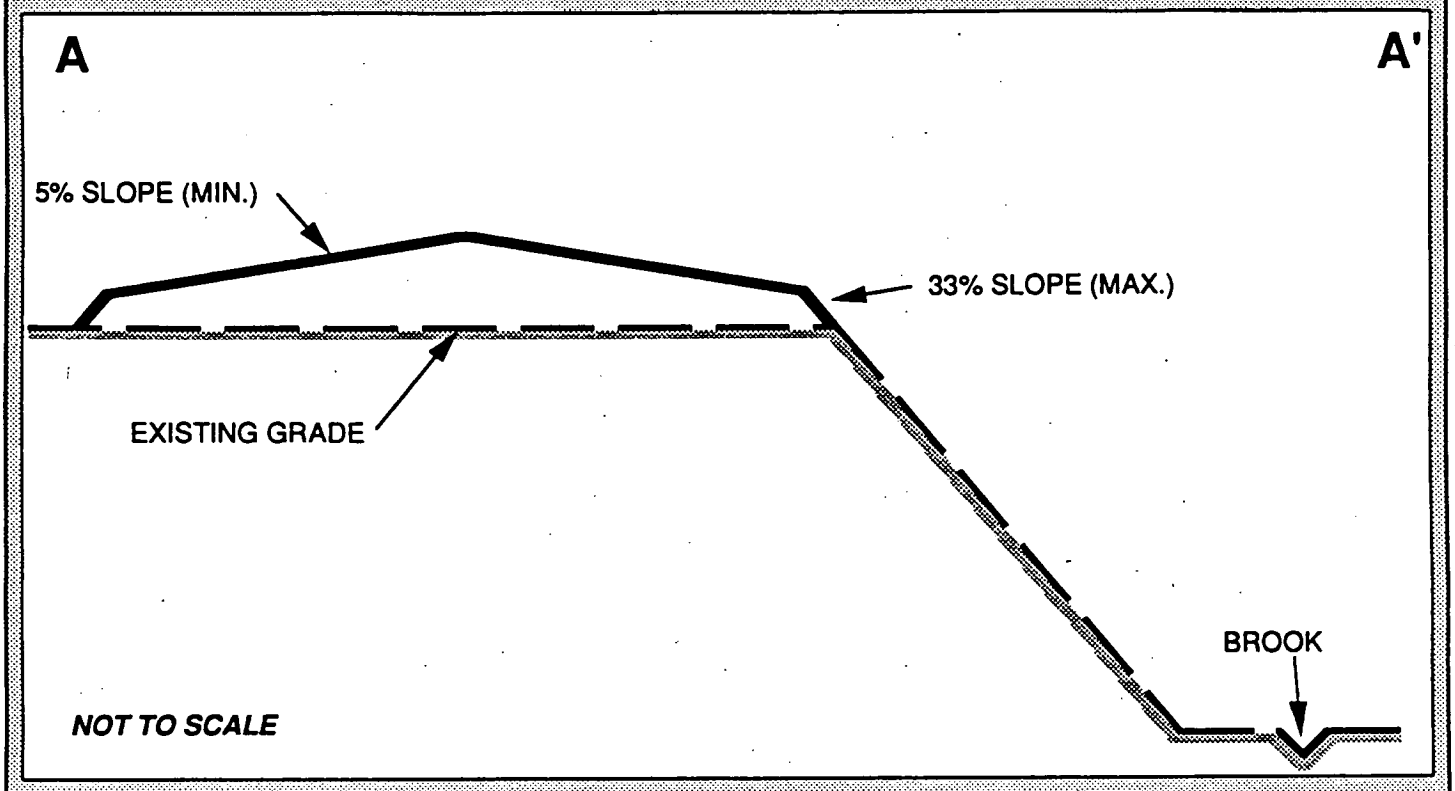
Components of this remedial alternative are described in the following paragraphs.

Site Preparation. Site preparation would be minimal. No road construction would be necessary because the site is open and accessible. A potential area for storing cover soil is shown in Figure 6-1, but the exact area would be identified during remedial design. An area would be identified and prepared as necessary for parking heavy equipment. The site would be cleared, grubbed, graded, and proofrolled to provide the proper contours for the final cover. This site preparation work would be accomplished before covering the site and would require approximately two days to complete. Efforts would be made to minimize clearing and grubbing of existing vegetation to limit potential erosion problems, and erosion control fencing or hay bales would be used during site preparation and cover construction to prevent sediment transport off site. If necessary, fugitive dust would be controlled during construction by the use of water sprays.

Cover Construction. The cover system will be designed to meet the minimum performance requirements for closure of an attenuation landfill and will minimize future potential human health risks by reducing exposure to surface soils. The cover system requested by MEDEP and described in the State of Maine solid waste regulations includes 18 inches of recompacted clay overlain by 6 inches of soil suitable for vegetative cover growth. Other options for constructing a low-permeability cover include using a flexible membrane liner (a durable plastic material) or a **bentonite** geocomposite liner (a thin material composed of dry bentonite on or between a geotextile). Either of these options would require approximately 2 feet of soil above the liner to protect it from damage (the top 6 inches would be suitable to support vegetative cover growth). If a geocomposite or flexible membrane liner is used, it would be installed by a qualified subcontractor. Cover soils would be delivered to the site from a borrow source (to be determined), spread, compacted, and graded using conventional construction equipment (e.g., a tracked bulldozer). To promote runoff, the cover would be sloped in all directions no less than 5 percent, as required by MEDEP regulations (Figure 6-2). The approximate 100-by-100-foot area shown on Figure 6-1 would cover the location of the maximum detected PAH concentration. To prevent adverse effects on the stream environment, the cover system would not be extended down the embankment.

Site Inspection and Maintenance. Periodic visual inspections of the soil cover would identify whether maintenance is necessary. If maintenance is necessary, additional work or repairs to support erosion control or to revegetate covered areas would be


JORDAN AVENUE WELL FIELD
APPROX. 1,800 FEET
MAINE CENTRAL RAILROAD
ANDROSCOGGIN RIVER
APPROX. 1,800 FEET
N
ROUTE 24
PERIMETER ROAD
A
A'
LEGEND
APPROXIMATE LIMITS OF SITE 8 SOIL COVER
GROUNDWATER FLOW DIRECTION
PROPOSED STORAGE AREA FOR COVER SOILS, EQUIPMENT
FENCE
STREAM
TREELINE
CULVERT
CROSS SECTION LOCATION
SCALE IN FEET
0
100
200
BASE MAP PREPARED FROM PLANS COMPILED AND CONTROLLED BY JAMES W SEWALL CO. OLD TOWN, ME., 26 SHEETS, DATED 11-12-81 AND FROM PLANS ENTITLED "U S NAVAL AIR STATION BRUNSWICK MAINE" 9 SHEETS, COMPILED IN JANUARY 1984 MODIFIED BY E C JORDAN CO BASED ON FIELD OBSERVATIONS
E.C. JORDAN CO.
CONSULTING ENGINEERS
INSTALLATION RESTORATION PROGRAM
NAVAL AIR STATION
BRUNSWICK, MAINE
ALTERNATIVE 8C: SOIL COVER
SITE 8
PROPOSED PLAN SITE 8
6836-03
FIGURE 6-1



E.C. JORDAN CO. CONSULTING ENGINEERS	CROSS SECTION A-A' CONCEPTUAL SOIL COVER FINAL GRADES
INSTALLATION RESTORATION PROGRAM NAVAL AIR STATION BRUNSWICK, MAINE	PROPOSED PLAN SITE 8
	JOB NO. 6836-03 — FIGURE 6-2

9208003D

performed. The cover would need to be mowed periodically to prevent the growth of plants whose roots could damage the low-permeability cover. These activities could be incorporated into NAS Brunswick's regular maintenance program.

Institutional Controls. To prevent people from disturbing the cover system, a fence would be erected to limit access and signs would be posted along the fence. Restrictions on land use would be incorporated by NAS Brunswick to limit future use of the site.

Environmental Monitoring. The USEPA requested periodic monitoring of surface water and sediment in the tributaries bordering Site 8. Chemical analysis of samples for inorganic contamination would provide information for comparison to baseline conditions (i.e., data from the RI) and to AWQC. The sampling frequency, duration, and analytical parameters would be established following remedial design in a monitoring plan for the site.

Five-year Site Review. Under CERCLA 121c, a five-year site review is required for any site where contaminants remain on site at levels that do not allow for unlimited exposure or land use. USEPA guidance is under development to define the five-year review process; however, it is expected to focus on evaluating whether the remedial alternative continues to provide adequate protection of human health and the environment. The five-year site review could recommend further remedial actions at the site or that no further action is necessary. For cost estimating purposes it was assumed that five-year site reviews would be conducted every five years for 30 years. The five-year review would be conducted in cooperation with MEDEP and USEPA.

Estimated Time for Design and Construction: 7 months
Estimated Time of Operation: Minimum of 5 years of monitoring, 30 years of cover maintenance
Estimated Capital Cost: $185,000 to $205,000
*Estimated Operations and Maintenance Costs (**net present worth**): $199,000*
Estimated Total Cost (net present worth): $462,000 to $484,000

The range of costs reflects different material and installation costs for the three possible options. Cost estimates do not include soil borrow source studies by the engineer.

7.0 OTHER ALTERNATIVES EVALUATED IN THE FEASIBILITY STUDY

The public is also invited to comment on the other two alternatives the Navy developed and evaluated. Each of these alternatives is briefly described below and discussed in more detail in the FFS Report (E.C. Jordan Co., 1992).

7.1 NO ACTION

The No Action Alternative does not include any remedial actions and provides a baseline for comparing alternatives. In the No Action Alternative, the site would remain undisturbed. Because no remedial actions would be implemented, long-term human health risks for the site would essentially be the same as those identified in the baseline risk assessment (E.C. Jordan Co., 1990). Environmental monitoring and five-year site reviews would be included as part of this alternative.

Environmental monitoring would be conducted to identify any changes in site contamination that may occur over time. Monitoring would include sampling of groundwater, surface water, and surface soils. A five-year review would be conducted to evaluate the monitoring data and determine if any additional actions are warranted.

Estimated Time for Design and Construction: Not applicable
Estimated Time of Operation: Minimum 5 years of monitoring
Estimated Capital Cost: None
Estimated Operations and Maintenance Costs (net present worth): $134,000
Estimated Total Cost (net present worth): $161,000

7.2 MINIMAL ACTION

The Minimal Action Alternative would use institutional controls to limit future activity at the site. Monitoring and five-year site reviews would also be conducted.

Land-use restrictions can be used to restrict future site use, thereby limiting the potential for human exposure to contaminants. The legal implications of instituting land-use restrictions would be coordinated with appropriate Navy officials and state

and local governments. If NAS Brunswick ever closed, these restrictions would be placed on future development. Fencing and warning signs would be placed around the site to reduce public access and potential exposure to soil contaminants. The fence was assumed to be an 800-foot-long, 6-foot-high chain-link fence with three strand barbed wire for cost estimating purposes. Warning signs would be posted along the fence and there would be one access gate.

Estimated Time for Design and Construction: 2 months
Estimated Time of Operation: Minimum of 5 years of monitoring
Estimated Capital Cost: $21,000
Estimated Operations and Maintenance Costs (net present worth): $143,000
Estimated Total Cost (net present worth): $197,000

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

In FS reports conducted for remediating hazardous waste sites under CERCLA, the USEPA requires that remedial alternatives be evaluated using nine criteria. These nine criteria are used to select a remedy that meets national Superfund program goals of protecting human health and the environment, maintaining long-term protection, and minimizing untreated waste. Definitions of the nine criteria and a summary of the Navy's evaluation of the proposed remedial action and the other alternatives using the nine criteria are provided in the following subsections.

8.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Overall Protection of Human Health and the Environment addresses how an alternative as a whole will protect human health and the environment. This includes an assessment of how human health and environmental risks are properly eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Currently, all of the alternatives provide adequate protection of human health and the environment. The current risk at the site is within USEPA acceptable levels. The Minimal Action and Soil Cover Alternatives provide some additional reduction in risk by limiting exposure to contaminated soils. The No Action Alternative may not be protective of human health if a residential development were located nearby in the future.

8.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Compliance with **Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether or not a remedy complies with all state and federal environmental and public health laws and requirements that apply or are relevant and appropriate to the conditions and cleanup options at a specific site. If an ARAR cannot be met, the reasons must be clearly stated and a waiver may be required.

The soil cover requested by the State of M aine in the Soil Cover Alternative would meet the performance requirements of the Maine Landfill Disposal Regulations for Solid Waste Landfills (38 MRSA Section 1304, Chapter 401.7), which is relevant and appropriate. All work on site, including monitoring, would be conducted in accordance with Occupational Safety and Health Administration (OSHA) requirements. Fugitive dusts from clearing, grading, and cover construction activities would be controlled (e.g., by using water sprays) to meet the requirements of the Clean Air Act. Location-specific ARARs require that erosion control measures such as revegetation and erosion control fencing be used to prevent sediment transport off site. The Soil Cover Alternative would comply with location-specific ARARs governing the alteration of rivers, streams, and brooks because the soil cover would not be extended into the ravine.

The No Action and Minimal Action alternatives would not meet the Maine requirements for closure of solid waste landfills. Environmental monitoring would be conducted in accordance with OSHA requirements. The implementation of either of these alternatives would not cause further degradation of surface water or groundwater quality.

There are no chemical-specific ARARs for contaminants in soil. It is likely that chemical analysis of groundwater sampled from silt- and clay-rich strata would continue to show inorganic contaminants such as cadmium in excess of MCLs. Similarly, remedial action at Site 8 would not reduce inorganic contaminant concentrations below AWQCs in surface water because other nonpoint source areas would still exist. For these reasons, remedial alternatives were not developed to address groundwater or surface water.

8.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Long-term Effectiveness and Permanence refers to the ability of an alternative to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

No unacceptable risk currently exists at the site. There is a slight risk associated with a future residential scenario, so the No Action Alternative may not protect human health in the future. The Minimal Action and Soil Cover Alternatives would

effectively limit site access and cover the site, respectively, but would require inspection and maintenance over the long-term.

8.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Reduction of Toxicity, Mobility, or Volume through Treatment are three principal measures of the overall performance of an alternative. The 1986 Superfund amendments emphasize that, whenever possible, USEPA should select a remedy that uses a treatment process to permanently reduce the level of toxicity of contaminants at the site, the spread of contaminants away from the source of contamination (i.e., mobility), and the volume or amount of contamination at the site.

None of the alternatives use treatment technologies that reduce toxicity, mobility, or volume. TCLP tests performed on site soils showed that Site 8 contaminants have a very low mobility in the present state.

8.5 Short-Term Effectiveness

Short-term Effectiveness refers to the likelihood of adverse effects on human health or the environment that may result during the construction and implementation of an alternative until cleanup goals have been achieved.

There would be no adverse effects on the community during implementation of any of the three alternatives. Dust suppression techniques would be used during cover construction for the soil cover alternative. Workers conducting environmental monitoring, fence installation, or cover construction would need to follow a site-specific health and safety plan. The three alternatives would not pose risks to workers because invasive actions would not occur.

Environmental impacts for the remedial alternatives are associated with removal of trees and brush and surface water runoff. The No Action Alternative would have no effects. The Minimal Action Alternative would require minor clearing of brush. The Soil Cover Alternative would require more extensive clearing and some engineering controls to handle surface water runoff.

8.6 IMPLEMENTABILITY

Implementability refers to the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement the alternative.

The No Action Alternative would be simple to implement. The Soil Cover Alternative would also be easily implemented; however, it would require a suitable borrow source to be located. The Minimal Action Alternative would require land use restrictions to be implemented.

8.7 COST

Cost includes the capital (up-front) cost of implementing an alternative as well as the cost of operating and maintaining the alternative over the long-term, and net present worth of both capital and operation and maintenance costs.

The capital, operation and maintenance, and total cost for each alternative is provided as part of the site description in the preceding sections on "The Navy's Preferred Alternative" and "Other Alternatives Evaluated in the FS." The major cost component in the No Action and Minimal Action Alternatives that makes them is long-term environmental monitoring. The cost estimate assumed that monitoring would continue for 30 years, so the cost of these alternatives would decrease if environmental monitoring were discontinued before 30 years had passed. The Soil Cover Alternative is the most expensive alternative, because in addition to environmental monitoring and institutional controls, the cost estimate includes material and construction costs for the cover system, engineering design costs, and long-term maintenance costs. Soil Cover Alternative costs estimated for three types of low-permeability materials (i.e., clay, flexible membrane liner, and geocomposite liner) were of the same order of magnitude. Selection of the cover material will occur during remedial design in cooperation with USEPA and MEDEP.

8.8 STATE ACCEPTANCE

State Acceptance addresses whether, based on its review of the RI/FS and Proposed Plan, the state concurs with, opposes, or has no comment on the alternative the Navy is proposing as the remedy for the site.

The State of Maine has reviewed this Proposed Plan and has provided comments and recommendations. The State may comment further after it has had an opportunity to review comments received during the public comment period.

8.9 COMMUNITY ACCEPTANCE

Community Acceptance addresses whether the public concurs with the Navy's Proposed Plan. Community Acceptance of this Proposed Plan will be evaluated based on comments received at the upcoming public meeting and during the public comment period.

8.10 SUMMARY

Of the nine criteria, protection of human health and compliance with all ARARs are requirements that must be met by all remedies. The Navy balances its consideration of alternatives with respect to long-term effectiveness and permanence; reductions of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. State and community concerns are considered as modifying criteria factored into a final selection of a remedy. Consideration of USEPA, state, and community comments have prompted the Navy to modify aspects of the preferred alternative from what was presented in the FFS.

9.0 THE NAVY'S RATIONALE FOR PROPOSING THE PREFERRED ALTERNATIVE

Based on current information and analysis of the RI and FFS reports, the Navy believes that the preferred cover alternative for Site 8 is consistent with the requirements of the Superfund law and its amendments, specifically Section 121 of CERCLA, and to the extent practicable, the NCP. All the alternatives presented in this Proposed Plan would provide overall protection of human health and the environment under current conditions; however, the Soil Cover Alternative may provide additional protection if the area is used for residential development in the future. In the Navy's analysis, the preferred alternative identified in this Proposed Plan is more effective than and comparable in cost to the other alternatives considered. In addition, in the Navy's estimation, the preferred alternative would achieve the best balance among the criteria used by USEPA to evaluate the alternatives. The preferred alternative would provide short- and long-term protection of human health and the environment, and would attain all federal and state applicable or relevant and appropriate human health and environmental requirements.

Administrative Record: A file established and maintained in compliance with Section 113(k) of CERCLA consisting of information upon which the lead agency bases its final decisions on the selection of cleanup method(s) for a Superfund site. The Administrative Record should be established at or near the site and made available to the public.

Applicable or Relevant and Appropriate Requirements (ARARs): ARARs include any state or federal statute or regulation that pertains to protection of public health and the environment in addressing certain site conditions or using a particular cleanup technology at a Superfund site. The Navy must consider whether a remedial alternative meets ARARs as part of the process for selecting a cleanup alternative for a Superfund site.

Attenuation Landfill: A landfill that is not designed to collect leachate. In an attenuation landfill, leachate infiltrates and is treated by the underlying soils before it reaches the groundwater or bedrock.

Baseline: With respect to the alternatives evaluated, a statement of existing conditions and their relative consequences should no further action be taken.

Bedrock: The layer of rock located below the glacially-deposited soil and rock under the ground's surface. Bedrock can be either solid or fractured (cracked); fractured bedrock can support aquifers.

Bentonite: A type of clay found in the northwestern United States that swells when it is hydrated with fresh water. This phenomenon gives bentonite its characteristics of plasticity, strength, and low permeability.

Carcinogen: A chemical that causes or induces cancer.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a trust fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, the USEPA can either: 1) pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work, or 2) take legal action to

force parties responsible for site contamination to clean up the site or pay back the federal government for the cost of the cleanup.

Dichlorodiphenyltrichloroethane (DDT): The first chlorinated hydrocarbon insecticide. DDT persists in the environment and bioaccumulates. The insecticide was banned in the United States in 1972 but was widely used until that point and is found at low concentrations throughout NAS Brunswick.

Ecological Hazard Index: The sum of the ratios of potential dietary exposure values to the reference toxicity value for each chemical. The potential dietary exposure represents the amount of contaminant an organism ingests, and the reference toxicity value is the amount of contaminant the organism can be exposed to before health effects occur. When the potential dietary exposure is greater than the reference toxicity value (i.e., HI > 1), ecological effects may be occurring. However, although effects to individual organisms may be occurring, there may be little or no effect on population growth, stability, or structure.

Feasibility Study (FS): A report that summarizes the development and analysis of remedial alternatives.

Focused Feasibility Study (FFS): A feasibility study that evaluates a limited number of alternatives for a specific area of a site.

Geophysical Survey: Site investigation techniques (e.g., magnetometer, ground-penetrating radar) that do not require invasive activity. These techniques are used to characterize subsurface conditions (e.g., buried drums or utilities, surface of bedrock).

Groundwater: Water found beneath the earth's surface that fills pores in soil and bedrock to the point of saturation. Groundwater may transport substances that have percolated downward from the ground surface as it flows toward its point of discharge.

Initial Assessment Study (IAS): Field investigations that confirm the presence of hazardous materials at a site.

Leachate: Contaminated liquid resulting from water flushing through a source area. Leachate can be produced when rain percolates through a disposal area. Leachate

seeps are small amounts of water flowing from the sides of stream embankments. They are typically orange-red in color because of the amount of iron in the water.

Maximum Contaminant Level (MCL): The maximum permissible level of a contaminant in water that is consumed as drinking water. These levels are determined by USEPA and are enforceable standards applicable to all public water supplies.

Maximum Contaminant Level Goal (MCLG): The maximum level goal of a contaminant in drinking water at which no known or anticipated adverse effect on human health will occur. USEPA establishes MCLGs under the Safe Drinking Water Act at threshold levels with a margin of safety for noncarcinogens and a zero level for carcinogens where the threshold level is unknown.

Maximum Exposure Guideline (MEG): The maximum permissible level of contaminant in water that is consumed as drinking water. These levels are determined by the State of Maine and are applicable to all public water supplies in Maine. The MEG typically coincides with the federal MCL for each regulated contaminant; however, risk-based calculations have resulted in some specific MEGs that are set at more stringent levels.

Micrograms per kilogram (µg/kg): A unit of measure used to describe levels of contamination on a weight per weight basis in soils. One microgram per kilogram is equal to one millionth of a gram of a contaminant in one thousand grams of material (i.e., soil). This unit of measure is also known as one part per billion.

Micrograms per liter (µg/L): A unit of measurement used to describe levels of contamination in water. One microgram per liter is equal to one millionth of a gram of a contaminant in one liter of water. This unit of measure is also known as one part per billion.

Milligrams per kilogram (mg/kg): A unit of measure used to describe levels of contamination on a weight per weight basis in soils. One milligram per kilogram is equal to one thousandth of a gram of a contaminant in one thousand grams of material (i.e., soil). This unit of measure is also known as one part per million.

Milligrams per liter (mg/L): A unit of measurement used to describe levels of contamination. One milligram per liter is equal to one thousandth of a gram of a

contaminant in one liter of water. This unit of measure is also known as one part per million.

Monitoring Wells: Wells drilled to collect groundwater samples for physical, chemical, or biological analysis to determine the amounts, types, and distribution of contaminants in the groundwater beneath the site.

National Oil and Hazardous Substances Contingency Plan (NCP): The federal regulation that guides determination of the sites to be corrected under the Superfund program and the program to prevent or control spills into surface waters or other portions of the environment.

National Priorities List (NPL): USEPA's list used to prioritize uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund.

Net Present Worth: The amount of money necessary to secure the promise of future payment, or series of payments, at an assumed interest rate.

Observation Wells: Wells drilled primarily for groundwater level measurements. These wells are constructed in exactly the same fashion as monitoring wells. Observation wells at Site 8 were sampled during the Supplemental RI field program to monitor groundwater quality northwest of the site.

Overburden Soil: Soil overlying the bedrock layer.

Pollution Abatement Confirmation (PAC) Study: A study conducted to confirm the presence of hazardous constituents or hazardous waste.

Polynuclear Aromatic Hydrocarbons (PAHs): A small group of chemicals typically formed during the combustion of hydrocarbon fuels, but that can also exist naturally in the environment. PAHs are found in high concentrations in urban or industrial areas or in the vicinity of airports. PAHs are relatively immobile in the environment. Some PAHs are believed to cause cancer, while others have not been observed to produce adverse health effects.

Record of Decision (ROD): A public document that explains the cleanup alternative to be used at a National Priorities List (NPL) site. The ROD is based on

information and technical analysis generated during the RI/FS and on consideration of the public comments and community concerns.

Remedial Alternatives: Cleanup options evaluated for a site to address contamination and contaminated media at the site.

Remedial Investigation (RI): The Remedial Investigation determines the nature and extent and composition of contamination at a hazardous waste site, and directs the types of cleanup options that are developed in the FS.

Risk Assessment: Evaluation and estimation of the current and future potential for adverse human health or environmental effects due to exposure to contaminants.

Sediment: The sand or mud found at the bottom and sides of bodies of water, such as creeks, rivers, streams, lakes, swamps, and ponds. Sediments typically consist of soil, silt, clay, plant matter, and sometimes gravel.

Soil Gas Survey: Technique used to measure the concentration of contaminants in the void spaces of near-surface soils.

Solvents: Liquids capable of dissolving other liquids or solids to form a solution. The chief uses of industrial solvents are as cleaners and degreasers. Solvents also are used in paints and pharmaceuticals. Solvents used in foundries and other industrial applications are frequently volatile organic compounds (VOCs). Many solvents are flammable and toxic to varying degrees.

Source: Area at a hazardous waste site from which contamination originates.

Stratified: Layered.

Superfund: The program operated under CERCLA and SARA that funds and carries out the USEPA solid waste emergency and long-term removal activities.

Surface Water: Bodies of water on the surface of the earth, such as rivers, lakes, and streams.

Test Pit: A trench generally excavated with a backhoe that allows characterization of soil types and collection of soil samples. Soils are backfilled upon completion of the sampling.

Transition: Soil unit consisting of varying layers of sands, silts, and clays.

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ARARs	Applicable or Relevant and Appropriate Requirements
AWQC	Ambient Water Quality Criteria
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DDT	dichlorodiphenyltrichloroethane
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
IAS	Initial Assessment Study
IRP	Installation Restoration Program
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MEDEP	Maine Department of Environmental Protection
MEG	Maximum Exposure Guideline
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MSL	mean sea level
NACIP	Navy Assessment and Control of Installation Pollutants
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priorities List
OSHA	Occupational Safety and Health Administration
PAC	Pollution Abatement Confirmation
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
RI	Remedial Investigation
ROD	Record of Decision

SARA	Superfund Amendments and Reauthorization Act
TCLP	Toxicity Characteristic Leaching Procedure
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound